



Reinforcing Flow Experience in Self-assessment Testing through Employing Neurofeedback Techniques

Authors: Ming-Chi Liu, Guan-Yu Chen,
Yueh-Min Huang

Presenter: Guan-Yu Chen



Outline

1. Computerized Testing
2. Flow Theory
3. Arousal Theory
4. Stress Theory
5. Instrument
6. Method
7. Experiments
8. Results



1. Computerized Testing

- Test System:
 - Item Analysis: Correct Rate, IRT, MIRT
 - Item Selection: Teacher's Profession, Algorithms
 - Ability Evaluation: Efficiency, Accuracy



1. Computerized Testing

- Computerized Testing
 - Test Tools
 - Doing Test, Marking Test Paper, Storing Results
 - Self-assessment
 - Adaptive Testing
 - Online Testing / Assessment
 - Web-based
 - System Decoration
 - Visualization, Message Types, Feedback, Availability, Usability



2. Flow Theory

- In positive psychology, flow, also known as zone, is the mental immersed in a feeling of energized focus, full involvement, and
- does.
- Flow is a pleasurable state of high productivity which can occur either during work or play.

Csikszentmihalyi, M. (1990). *Flow: The Psychology of Optimal Experience*. Harper & Row. ISBN 978-0-06-016253-5.

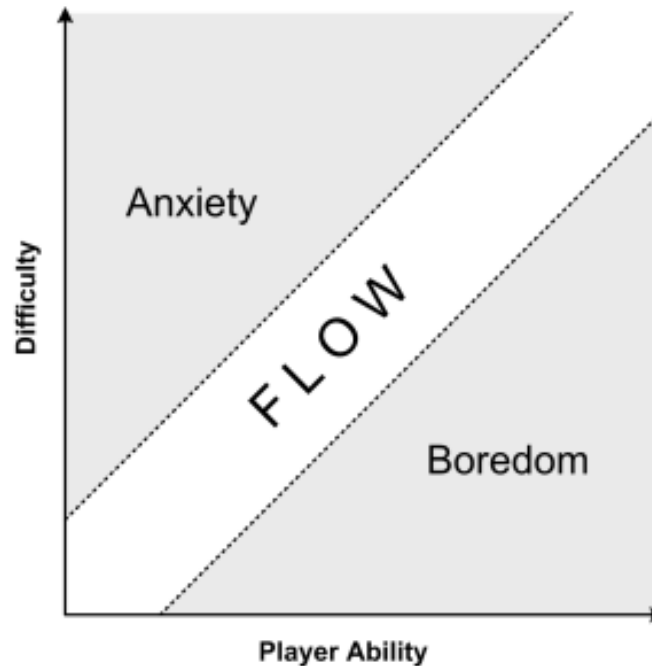
Nakamura, J., & Csikszentmihalyi, M. (2009). Flow theory and research. *Handbook of positive psychology*, 195-206. Oxford University Press. ISBN 978-0-19-803094-2.



2. Flow Theory

- the task that they have to do, then they enter the flow state.

- When the task is too easy, they become bored.
- When the task is too hard, they become anxious.
- When it's just right, they experience flow.





2. Flow Theory

- The hallmark of flow is a feeling of spontaneous joy, even rapture, while performing a task although flow is also described as a deep focus on nothing but the activity – not even oneself or one's emotions (Goleman, 1996).

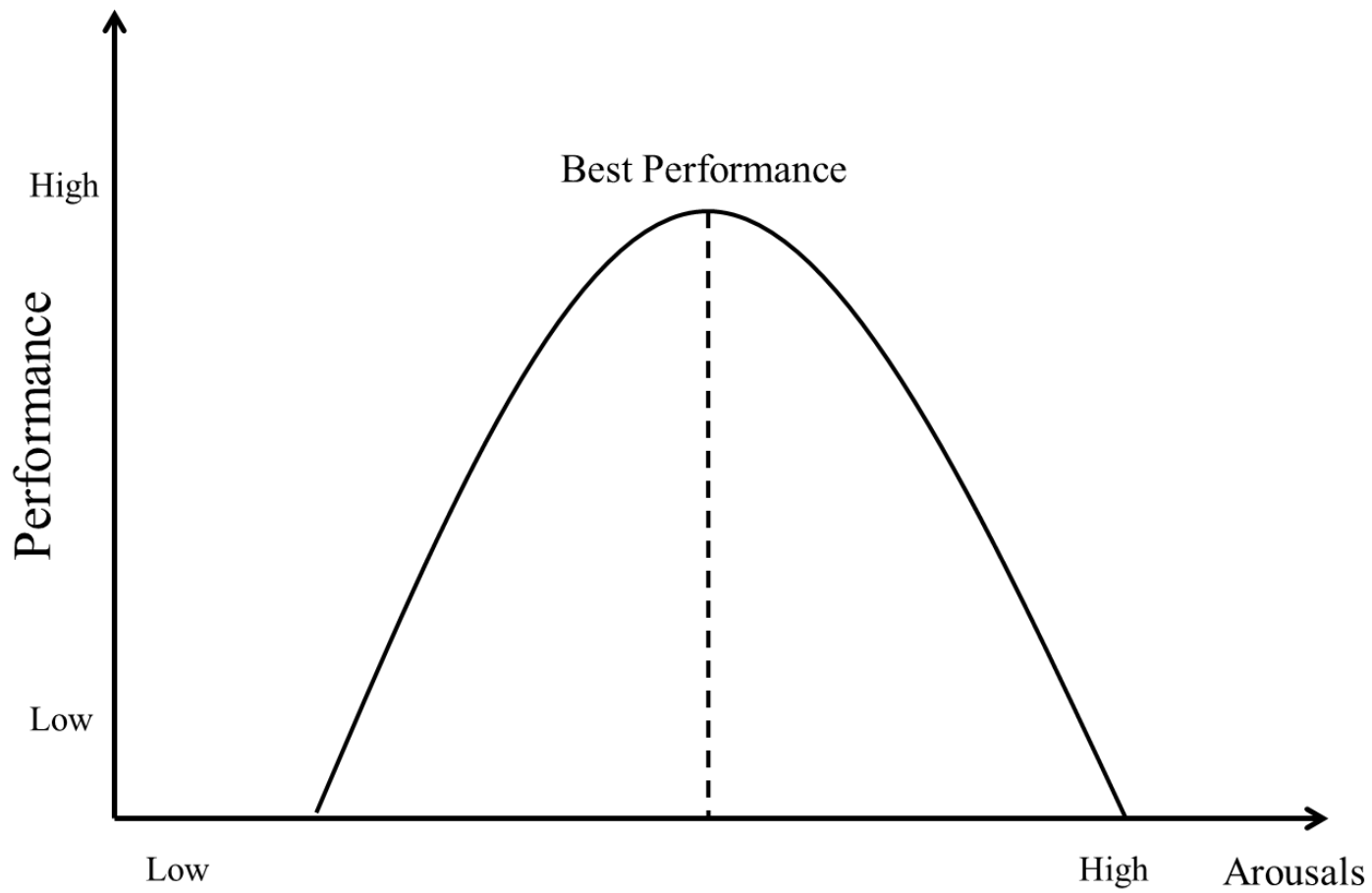


3. Arousal Theory

- Yerkes and Dodson (1908) developed an empirical relationship between arousal and performance, which named the Yerkes-Dodson law.
- This law indicated that a person's performance increased with mental arousal, but if the levels of arousal became too high, his/her performance decreased.



3. Arousal Theory



Yerkes-Dodson Human Performance Curve



4. Stress Theory

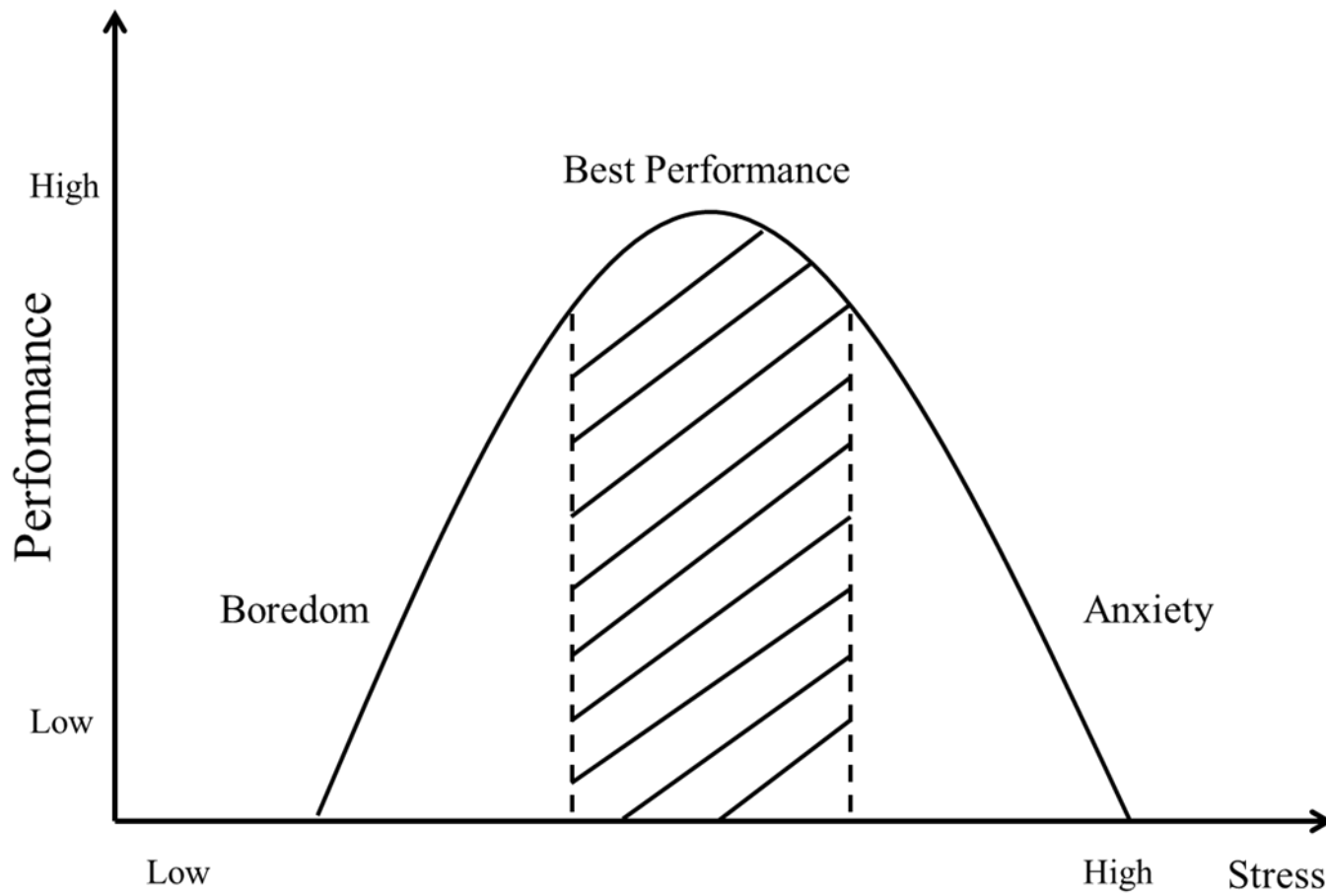
- Cox and MacKay (1976) redefined the law by emphasizing the psychological phenomenon of the stress.
 - If a person's stress is too low, he/she may feel boring.
 - Oppositely, if a person's stress is too high, he/she may break down.
- There exists a best performance that can be found under certain ranges of stress levels. When a person is in a state of flow, his/her performance is at the top of the performance curve (Payne, 2005).

Cox, T., & Mackay, C. (1976). A psychological model of occupational stress. A paper presented to The Medical Research Council. Mental Health in Industry, London, November.

Payne, R. (2005). *Relaxation Techniques - A Practical Handbook for the Health Care Professional* (3rd ed.). New York: Churchill Livingstone.



4. Stress Theory





5. Instrument

- Neurosky Mindware Mobile
 - ThinkGear



eSense: Attention & Meditation

EEG Spectrum: δ , θ , α , β , γ

RAW Data: 512 Hz

Eye Blink

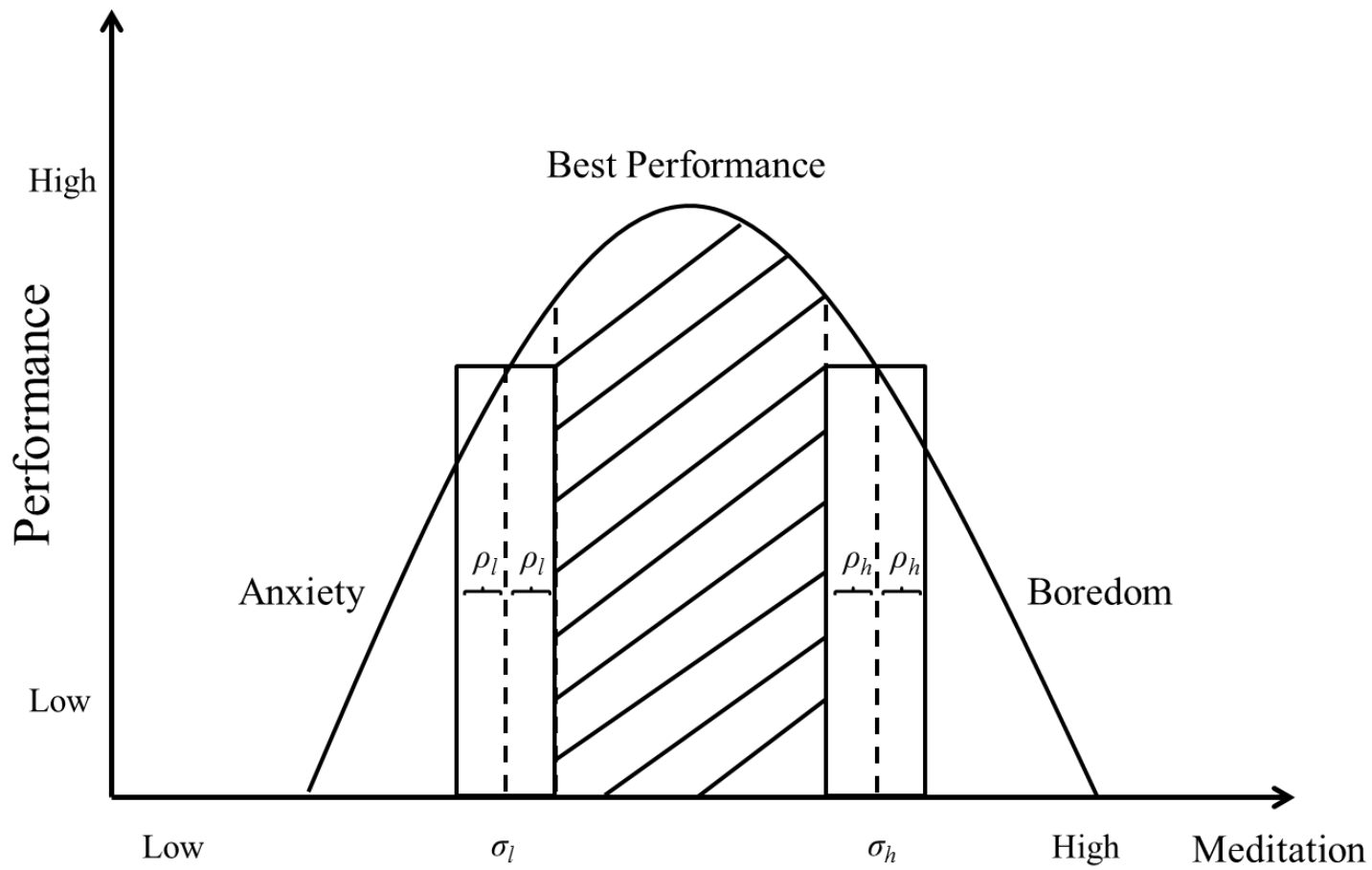


5. Instrument

- Advantages
 - **Simple Data:** *Attention, Meditation ...*
 - **Easy to Setup:** *Dry Electrode, Easy to Wear ...*
 - **Mobility:** *Bluetooth, Network ...*
 - **Software Support:** *Useful, Funny ...*
 - **Programmable**
- Shortcomings
 - **Only One Channel**
 - **Data & Sample Lose:** *Electrode Leaves skin*
 - **High Power consumptive:** *AAA Battery (5 hrs)*
 - **Uncomfortable:** *Earlobes Hurt, Too Big Head ...*

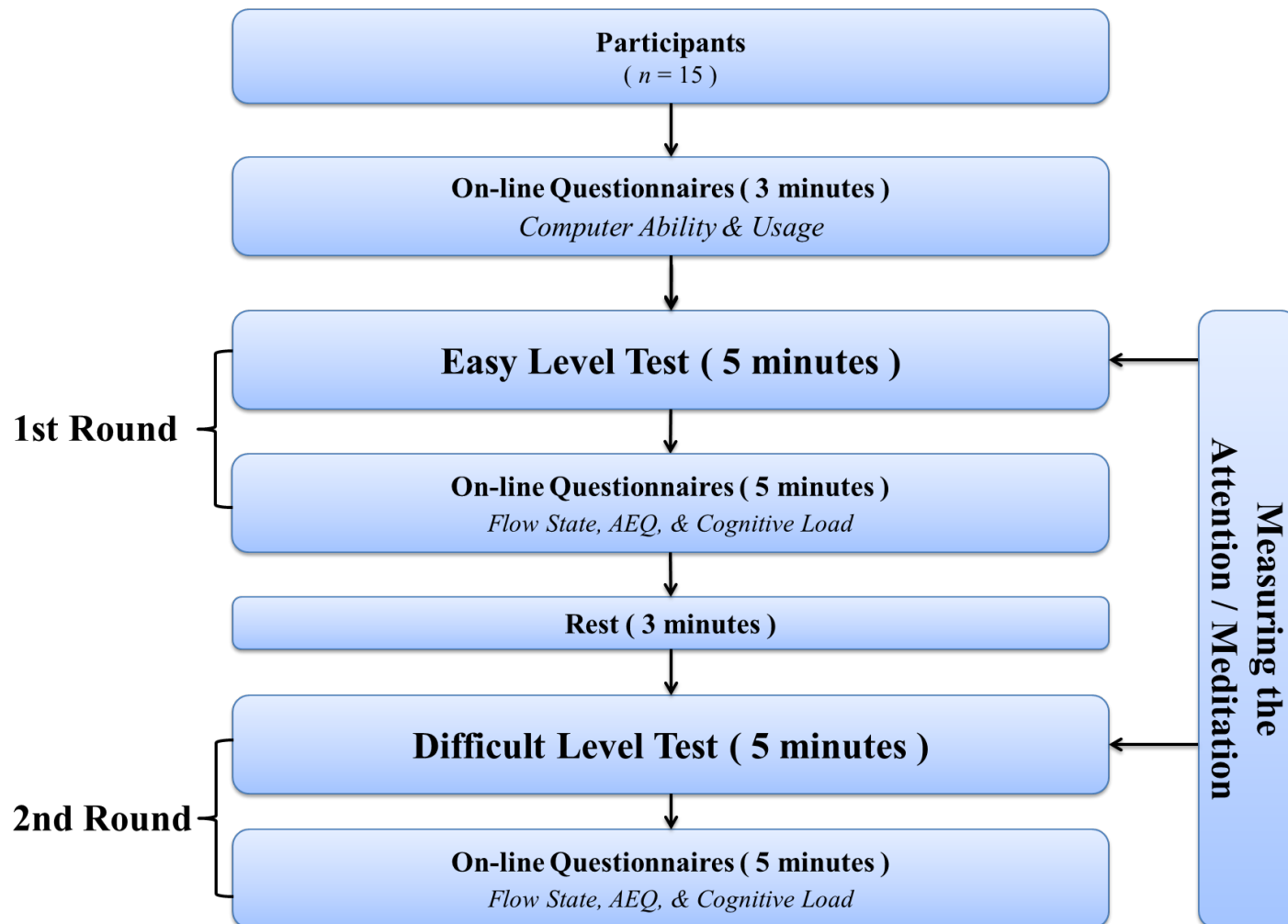


6. Method



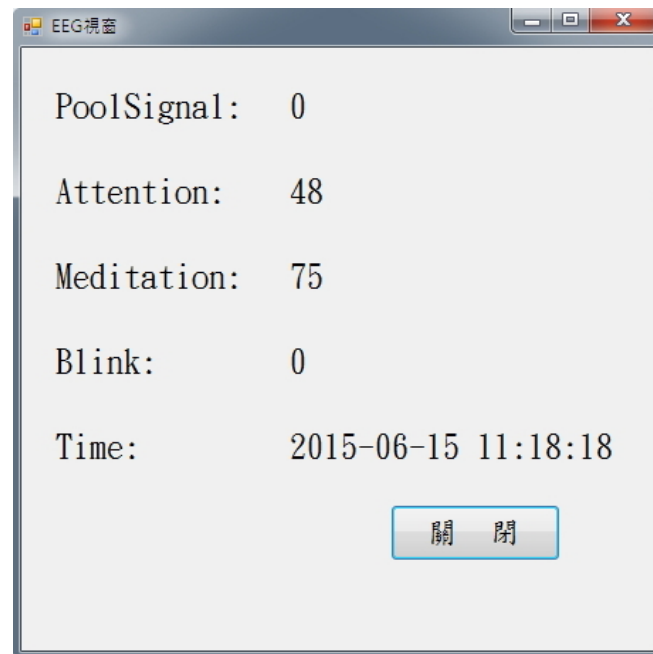
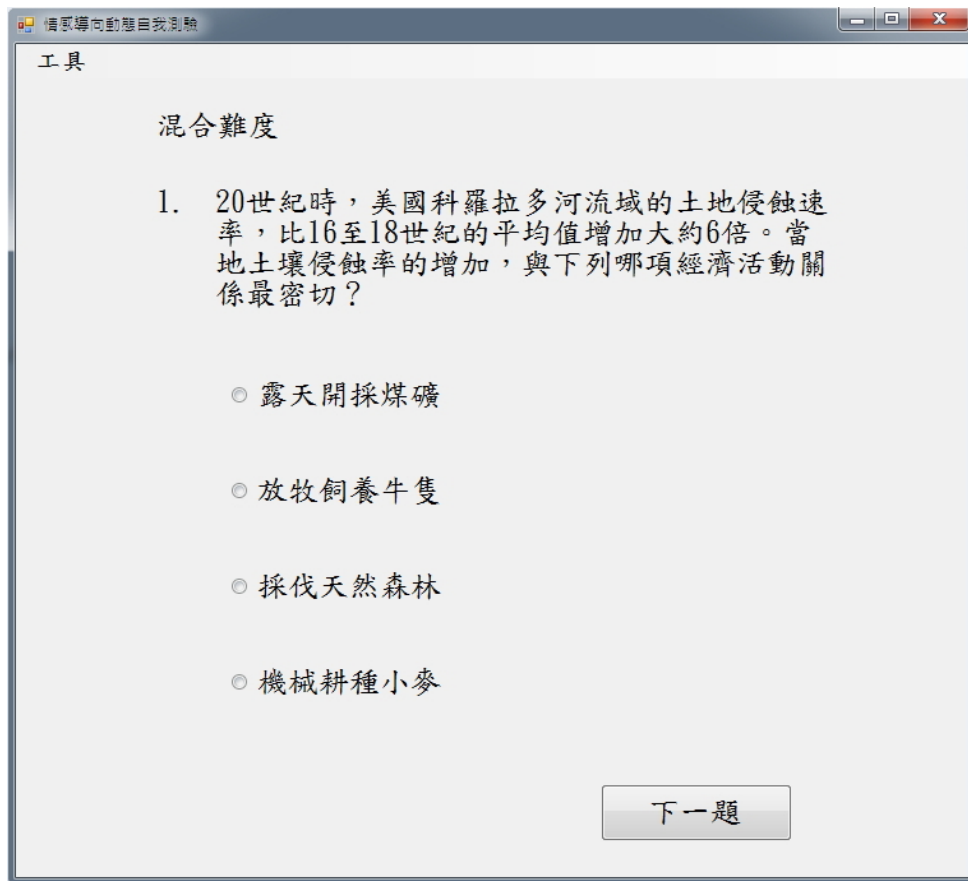


7. Experiments



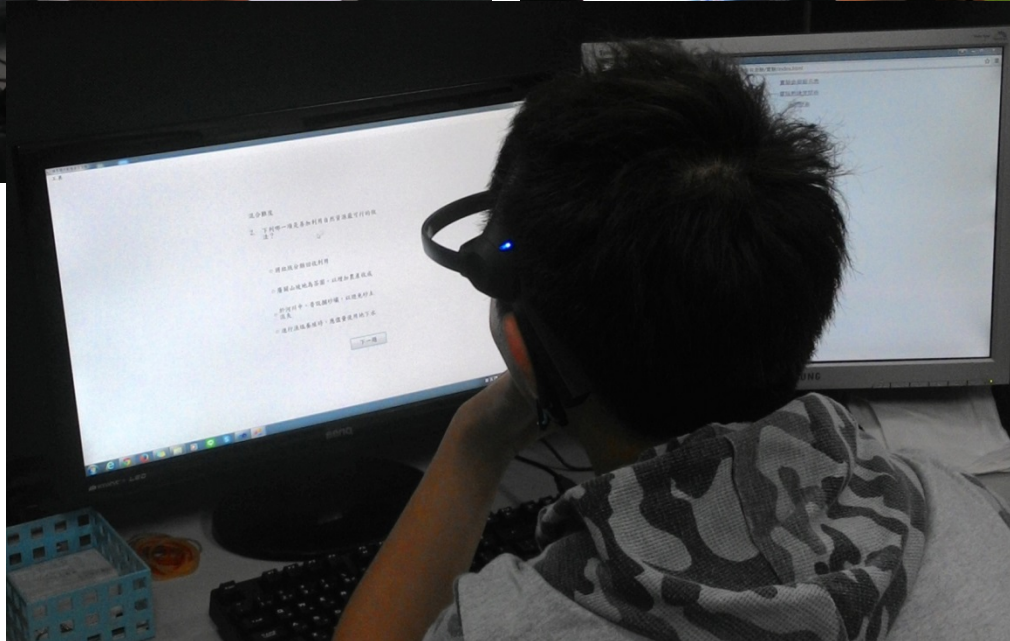
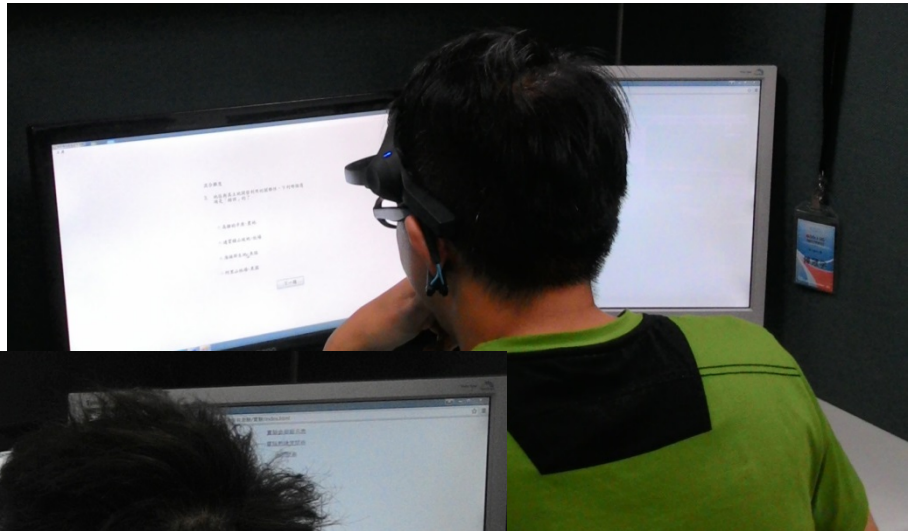
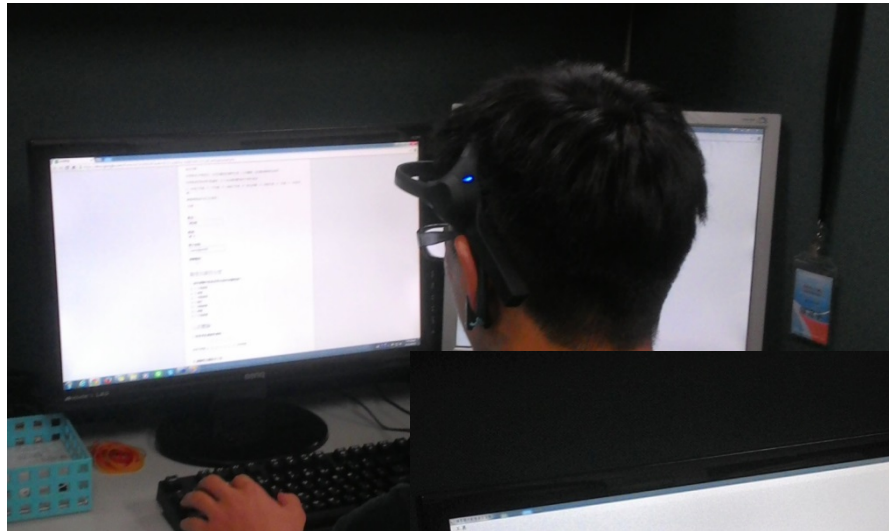


7.1 Test System Screenshot





7.2 Experimental Pictures





8. Results

15 Testees (Mean Age = 25.0667, SD = 3.01109)

Computer Skills & Usages

n = 15	Mean	SD	>= 4 (%)
1. I often use the computer.	4.8667	.35187	100.00
2. I am adept at using computers.	4.4667	.51640	100.00
3. I often use the Internet.	4.9333	.25820	100.00
4. I am adept at using the Internet.	4.8000	.41404	100.00
5. I often use computers for learning.	4.2667	.96115	80.00
6. I am adept at using computers for learning.	3.9333	.88372	73.33
7. I often use the computer test.	3.2000	1.08233	40.00
8. I am adept at using the computer test.	3.3333	.97590	46.67



8. Results

	Mean	n	SD	SEM
Attention Easy	53.1333	15	6.30042	1.62676
Attention Difficult	54.0667	15	8.16322	2.10773
Meditation Easy	46.6667	15	9.02114	2.32925
Meditation Difficult	44.0000	15	9.03960	2.33401

	Mean	SD	SEM	LB	UB	t	DF	Sig. (Two Tails)
Attention Easy - Difficult	-.93333	9.23090	2.38341	-6.04524	4.17857	-.392	14	.701
Meditation Easy - Difficult	2.66667	7.11805	1.83787	-1.27518	6.60851	1.451	14	.169



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The End~

Thanks!

A simple black and white cartoon drawing of a smiling face with a single hand raised in a waving gesture, positioned below the word "Thanks!".



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Q & A

